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LETTERS TO THE EDITOR.

*. "The attention of scientific men is called to the advantages of the correspondence columns of SCIENCE for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The occurrence of similar inventions in areas widely apart.

IN *Science* of May 20, Dr. Franz Boas has reviewed in a very courteous manner my plan of studying and exhibiting anthropological material, to which I am happy to make reply.

I think that Dr. Boas honors me overmuch in giving me the entire credit for a system which had taken possession of some men's minds before I was born. As your space will not allow an extended argument, I shall confine myself to general statements.

1. Whoever attempts to classify material must first have in his mind certain notions, ideas, or characteristics by means of which he will separate one object from another. These ideas let us call 'classific concepts.'

2. All curators of anthropological museums must recognize the following classific concepts: material, race, geographical areas, social organizations, environment, structure and function, and evolution or elaboration. Besides these, there are other minor concepts which enter into a more minute classification.

3. Every scientific anthropologist charged with a great collection has in his own mind decided the order in which these concepts should be considered in the distribution of material, and I consider this the greatest blessing to science. If all the museums in the world were arranged upon the same plan, only one set of philosophical problems could be considered, and the study would be correspondingly circumscribed. If, however, such a measure becomes necessary, I sincerely hope the plan will be that of the national museum at Washington. Let it be distinctly kept in mind that the only difference among curators is in the degree of prominence given to each concept.

4. There is another factor which enters into the arrangement of material, and that is those who are to study the material. For instance, there are archeologists, ceramists, musicians, technologists of many kinds, and students of war, religion, and the aesthetic arts, who desire to see, in juxtaposition, the specimens which they would study. On the other hand, there are ethnologists and sociologists who desire to see all that belongs to a consanguine race, or to a geographical area, in juxtaposition.

One of the most delightful *incentives technique* as the ruling concept is the great variety of intelligent people who can be brought into co-operation in the work. It seems that there is something for everybody on earth to do, and I attribute the phenomenally rapid growth, at little cost, of the national museum, to the great variety of minds that catch its spirit and are glad to work for it in their several spheres.

Now, in a museum properly constructed it is possible to arrange the cases in the form of a checker-board, so that by going in a certain direction the parallels of cases represent races or tribes or locations. By inspecting the same cases in a direction

at right angles to the former, the visitor may study all the products of human activity in classes according to human wants. At any rate, whatever the fundamental conception be, in any museum every thing should tend to enlist the sympathies and co-operation of the greatest diversity of mind.

Finally, as regards similarities in the products of industry of areas wide apart, I think Dr. Boas's suggestion about superficial similarities from unlike causes a very ingenious one, but it has nothing to do with the case. Except in a general way, his affirmation that similar effects proceed from different causes will hardly meet with acceptance, in the face of the axiom that 'like effects spring from like causes.'

In another place I have sought to show the gradations of similarities. Superficial, formal, or functional similarities in nature may spring from diametrically opposite motives, as in the case of mimicry. But according to the doctrine of chances, the possibility of similar effects diminishes with the complexity of the organization and the number of co-operating factors.

The perplexing question is this: Can these similarities be made to throw any light upon the migrations of men? The philosophical ethnologist is always in a 'double corner,' by reason of two interpretations of similarities. — the one arguing contact of some kind; the other, disconnected causes, whether similar or dissimilar it matters not.

I think it is a growing conviction that inventions of both customs and things spring from prior inventions, just as life springs from life, and that the sooner we recognize the fact that in the study of arts, institutions, language, knowledge, customs, religion, and races of men, we must always apply the methods and instrumentalities of the biologist, the sooner will our beloved science stand upon an immovable foundation.

There is a disposition to magnify the importance of museum specimens. The valuable thing about them is the knowledge we acquire concerning them. A museum is an encyclopaedia, with specimens instead of pictures. I hold, and would emphasize, the opinion that the explorer who goes among a people to study their entire creed and activity will do his work better by having in his mind the determination to bring each industry into comparison with the same activities in other times and places.

There is one thought which should always be borne in mind in considering the biological method of treating ethnological material. In the natural world some beings are monorganic, others are polyorganic. It is so in the history of human inventions, therefore in the arrangement of specimens there are things which must always appear in sets. No one should think of separating a suit of clothing, a full-rigged vessel, the entire outfit of the arrow-maker, potter, weaver, or other craftsman. Professor Putnam would not think of separating the entire contents of a mound. Each of these things mentioned is a polyorganic unit whose parts are just as much related as the parts of the human body.

In conclusion, it is but just to remark that during the two years in which I have had charge of the department of ethnology in the national museum, I have given no attention as yet to the west coast of America from California to Mount St. Elias. To this fact, and not to any fault in my system, must

be attributed the difficulty which Dr. Boas encountered in studying our material in comparison with his own from that region.

O. T. MASON.

Washington, May 30.

An American dialect society.

Referring to the letter by R. B. in *Science* of May 20, it is certainly possible to establish an American dialect society. Yet I believe it much the better way to have the work undertaken by the American philological association than to form a new society. In my opinion, the advance of philological science will be much more readily promoted by a combination of the various societies now existing than by the formation of others. Philology would be the gainer if the Oriental and Modern language associations could be united with the American under one control. The success of the American association for the advancement of science should teach that in union there is strength, and that a large society attracts not only more attention from the public, but brings to its meetings a much larger proportion, as I believe, of its own members. The work of a dialect society is so largely local in its character that it can best be done by a large number of persons. That such a work should be done needs little proof. The principal question is, By whom shall it be done?

S. C. DERBY.

Columbus, O., May 24.

The causation of consumption.

Within the last few years the attention of the medical profession has been more than ever turned to the consideration of the cause or causes of pulmonary consumption. The renewed interest in the etiology of this disease is owing to the discovery of the bacillus tuberculosis. This important event gave origin to two theories; the one holding that the only cause of consumption was the bacillus tuberculosis, and the other that the disease but furnished a *nidus* for the bacillus, and that hence its presence was not a cause, but an effect. This difference of opinion among physicians has not materially altered even to the present day; and, while the factors of the problem which give rise to this difference of opinion remain unsolved, it is savoring of dogmatism to say that it is decided that so and so is the cause of consumption.

As we proceed further in our investigation of the causation of consumption, we find the adherents of one theory placing great stress upon heredity, and, on the other hand, men of the highest authority and standing in the medical profession giving it as their opinion that there is no direct heredity other than that the child of phthisical parents starts in life with a small stock of vitality, and is thus rendered more liable to the invasion and the destructive influences of any and all diseases.

At the present state of the inquiry it seems somewhat too hasty to say just what the cause of pulmonary consumption may be; but it certainly appears that this cause is compound, being made up of at least three several elements: to wit, —

1°. The feeble vitality or resisting power with which the given organism enters upon life.

2° (a). The action of an environment upon this organism detrimental to the maintenance of a good general health; or (b) in some cases the existence of a state of debility after an acute disease.

3°. The organism thus influenced being exposed to the action of the bacillus tuberculosis.

The bacillus tuberculosis is so widely disseminated in the air we breathe, and distributed in the food we eat, that, were it the only or the main cause of consumption, we might expect the extermination of the human race within a few years.

We may plant corn upon unsuitable soil, and there will be no growth; we may plant it upon prepared soil and exclude the sunlight, heat, and moisture, and there will be no growth; and so the bacillus tuberculosis is deposited in the lungs of every one of us nearly every day, and yet it takes no hold upon the majority, because either the system is refractory to it, or our environment is such that it cannot develop.

JAMES P. MARSH.

Green Island, N.Y., May 30.

The equivalence in time of American marine and intracontinental tertiaries.

In a paper published in the May number of the *American journal of science*, Dr. C. A. White discusses the possibilities of correlating in detail the North American intracontinental and marine tertiaries, and refers to the identification by Prof. L. F. Ward of four species of plants from the tertiaries of the Mexican gulf border, with those found in the Laramie group. I am unable to refer to the report of Professor Ward, which has not yet reached this coast, and am therefore unaware whether the plants referred to are from the country east or west of the Mississippi River; but I would take this occasion to call attention again to the opportunities afforded for the establishment of such correlations, in north-western Louisiana, south-western Arkansas, and the adjacent portions of Texas and the Indian Territory, where the marine formations, still recognizable in detail by their characteristic shells, are indefinitely split up, both horizontally and vertically, into a maze of marine outliers and fresh and brackish water deposits, of the equivalence and continuity of which there can be no possible question. Among these, certain fresh-water deposits on the upper Red River in Louisiana are extremely rich in well-preserved leaves and fruits, of which a collection (deposited at the University of Mississippi at Oxford) was made by me in 1869. Among my publications setting forth these facts, I have, in a paper read at the Indianapolis meeting of the American association for the advancement of science in 1871, pointedly alluded to the probable original continuity of this 'Mansfield group' of Louisiana with intracontinental tertiaries, and the further probability, that, by means of remaining outliers, at least a chronological scale for parallelizing these formations might be established along the shallow connecting trough outlined by the cretaceous shore-lines. While my supposition that the cross-timbers of Texas were also of tertiary age, has since been disproved, I am not aware that any exhaustive examination of the region lying between the Red and Arkansas rivers in the Indian Territory has been made; yet it is there that such direct connection must have existed, if at all within tertiary times. The striking increase of the lignitiferous facies toward the north-western border of the Gulf tertiary area, culminating in the appearance of bands of fresh-water limestone at Mansfield and north-westward; the fan-like expansion, in Arkansas and Louisiana, of the older por-